



Oklahoma State University Electric Distribution Voltage Upgrade

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Introductions



- **Aaron Campbell, PE**
 - FSB Design Project Manager
- **Craig Spencer, PE**
 - Director of Energy Services
- **Dale Alexander**
 - Electrical Distribution System Project Engineer
- **Mike Hume**
 - Flintco Senior Project Manager
- **Steve Jordan**
 - Flintco Regional Safety Director
- **Ron Warner**
 - Flintco Project Director



THE WHY?

- Purchase Power Agreement
- Retire Power Plant – Construct New Central Plant
- Upgrade Phase 1 – Demo the Power Plant
- Power Distribution Center (PDC)
- Upgrade Phase 2 – Demo the OSU/Poultry Substation



Old switchgear lineup in Power Plant

Project – Summary

- 2400V electrical distribution system is generally in poor condition
- Connect new University Substation to the campus distribution system to share load with McElroy Substation
- 2400V system must be upgraded to 12.47kV in order to demolish the existing Power Plant (Phase 1)
- Power Distribution Center (PDC) Construction. The center for all power distribution on campus
- Voltage upgrade (Phase 2) must be completed prior to demolition of the Poultry Substation



Existing Power Plant



Existing Poultry Substation

University Substation Connection



ELECTRICAL DISTRIBUTION DUCTBANK FROM
NEW SUBSTATION TO NEW CENTRAL PLANT

NEW CENTRAL
PLANT

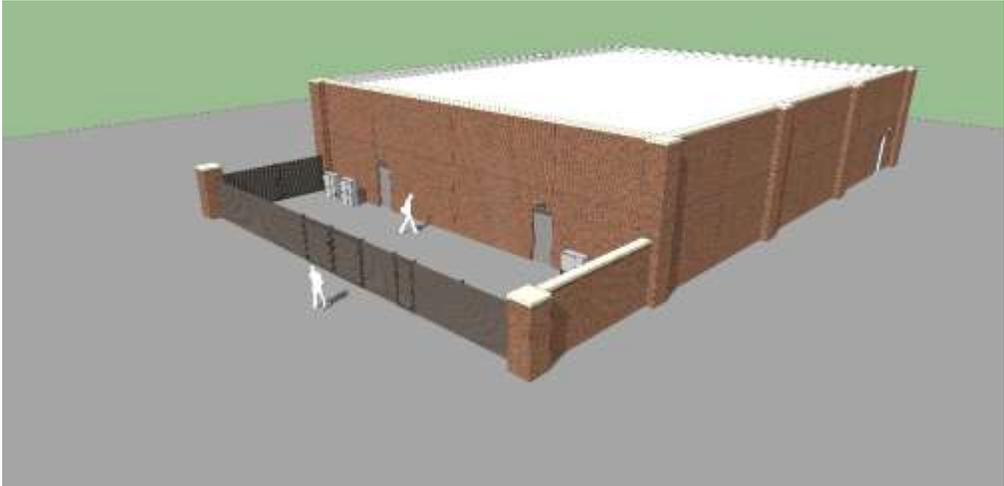
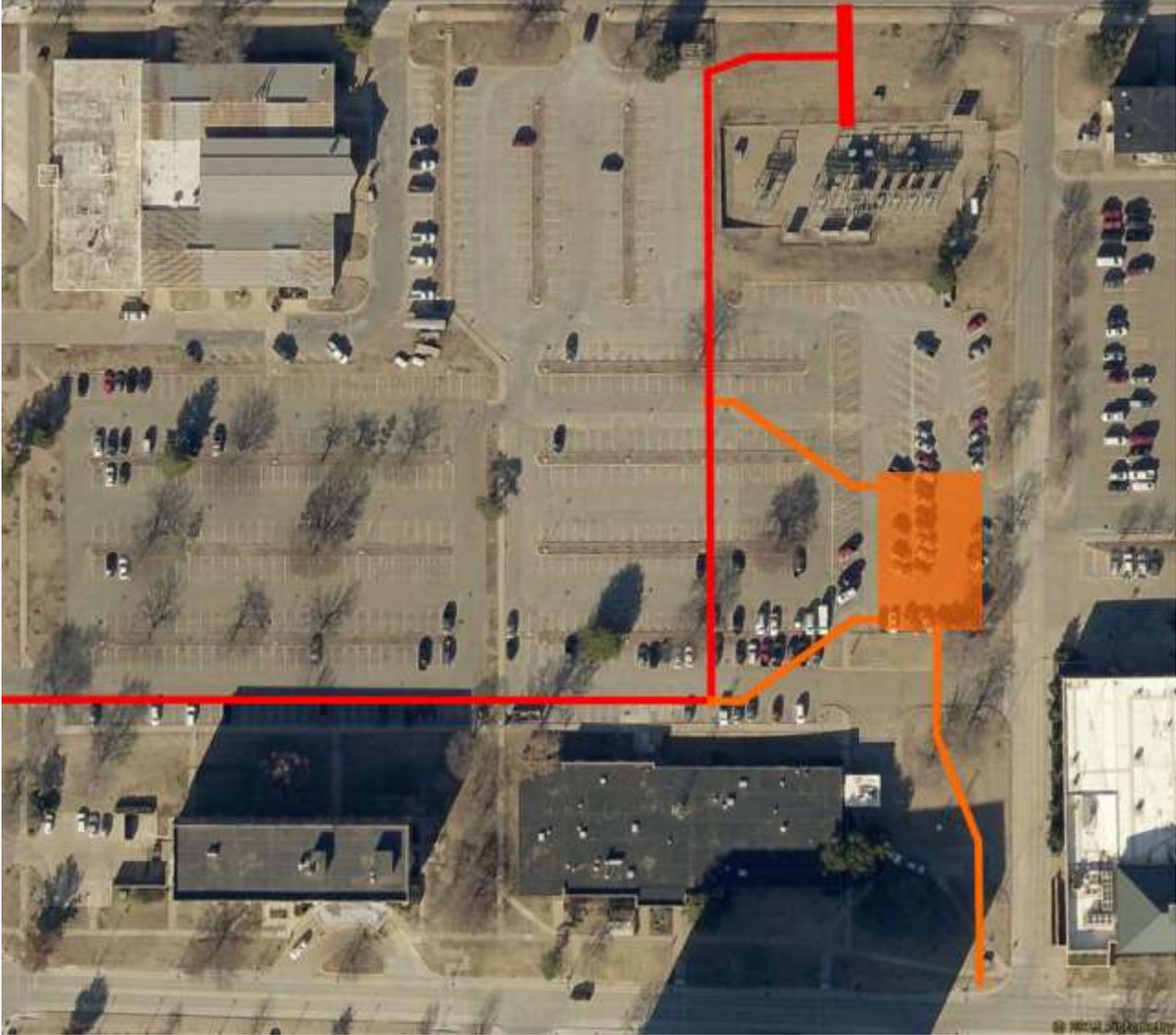
- 8027 LF DUCTBANK
- 21 VAULTS



Voltage Upgrade Overview



Power Distribution Center



Central Campus Infrastructure Upgrade



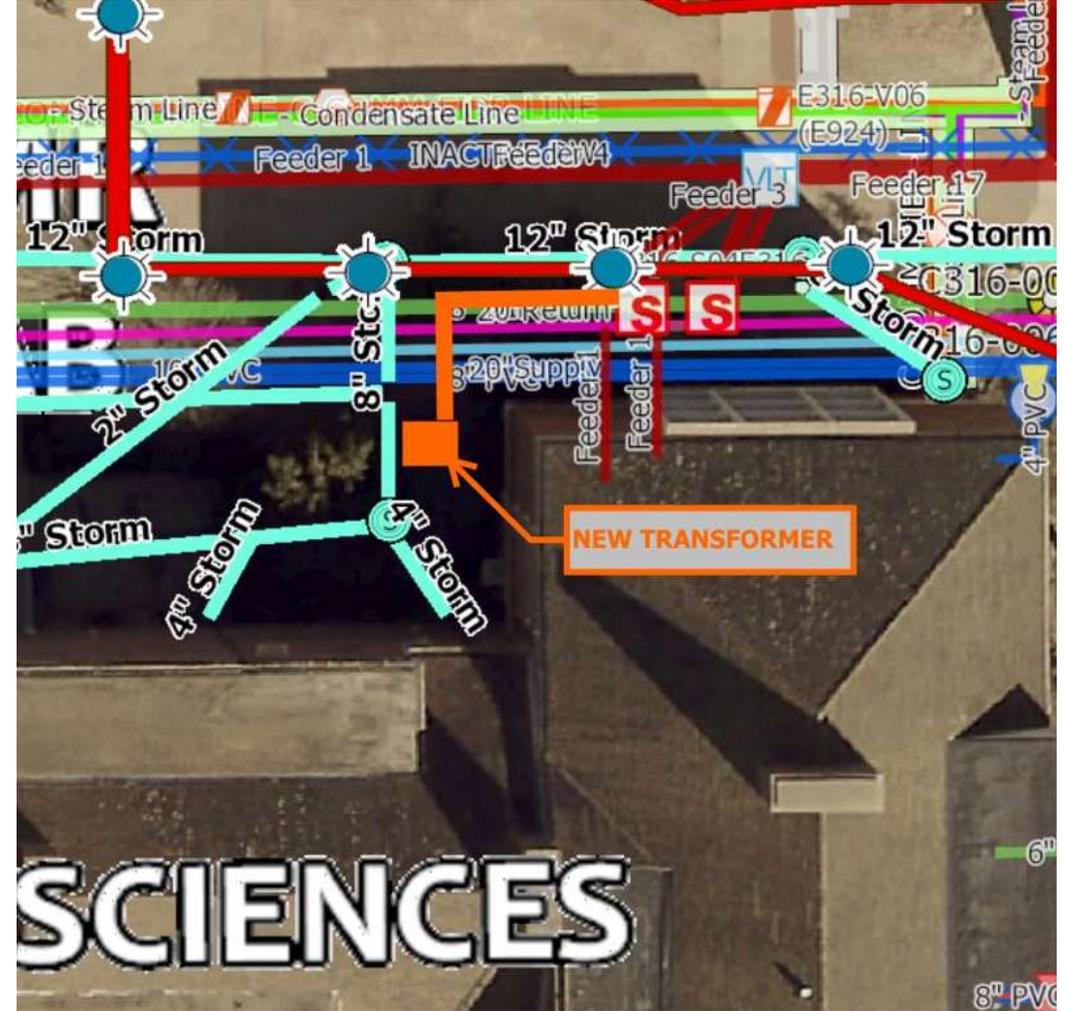
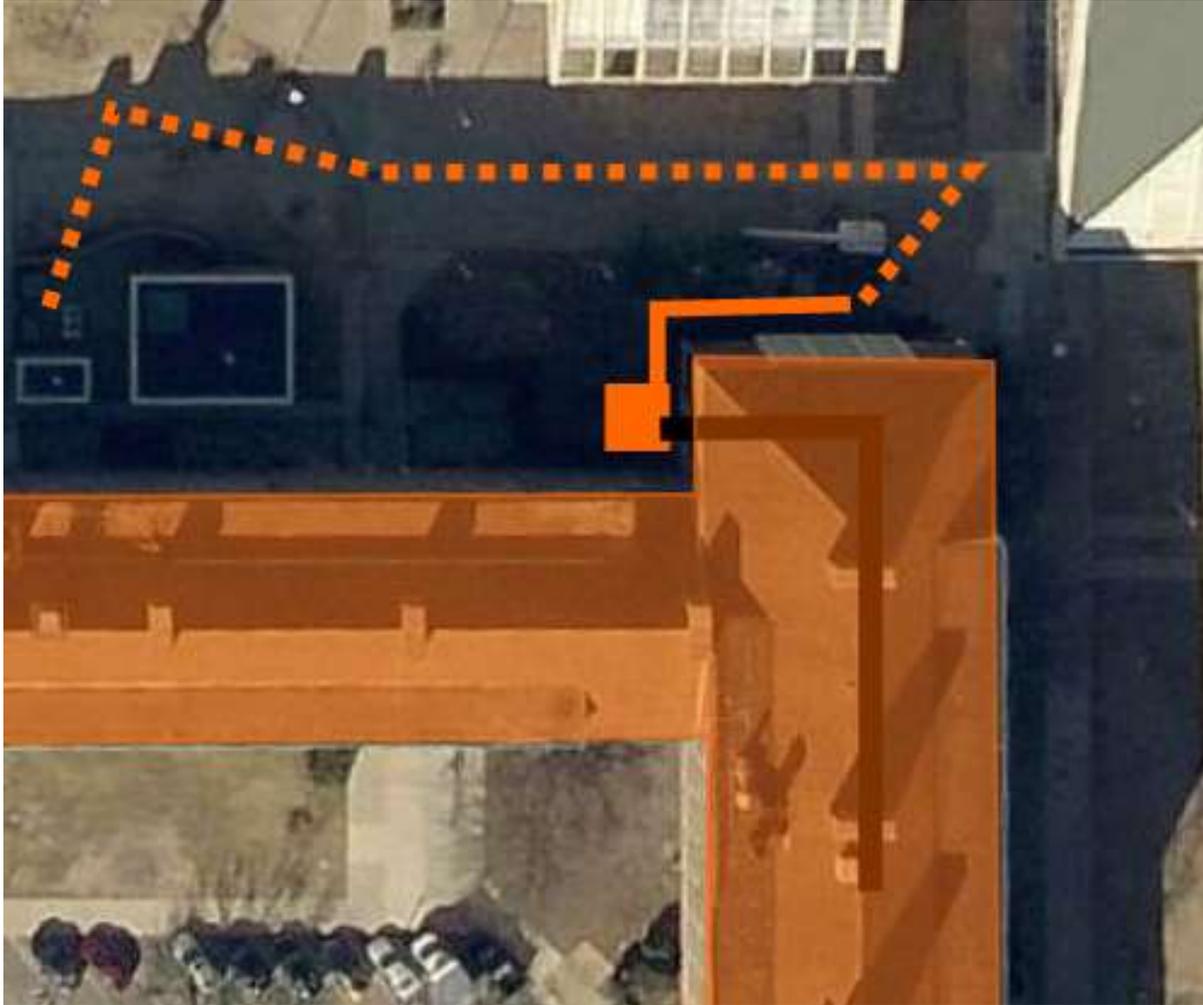
Southeast Campus Infrastructure Upgrade



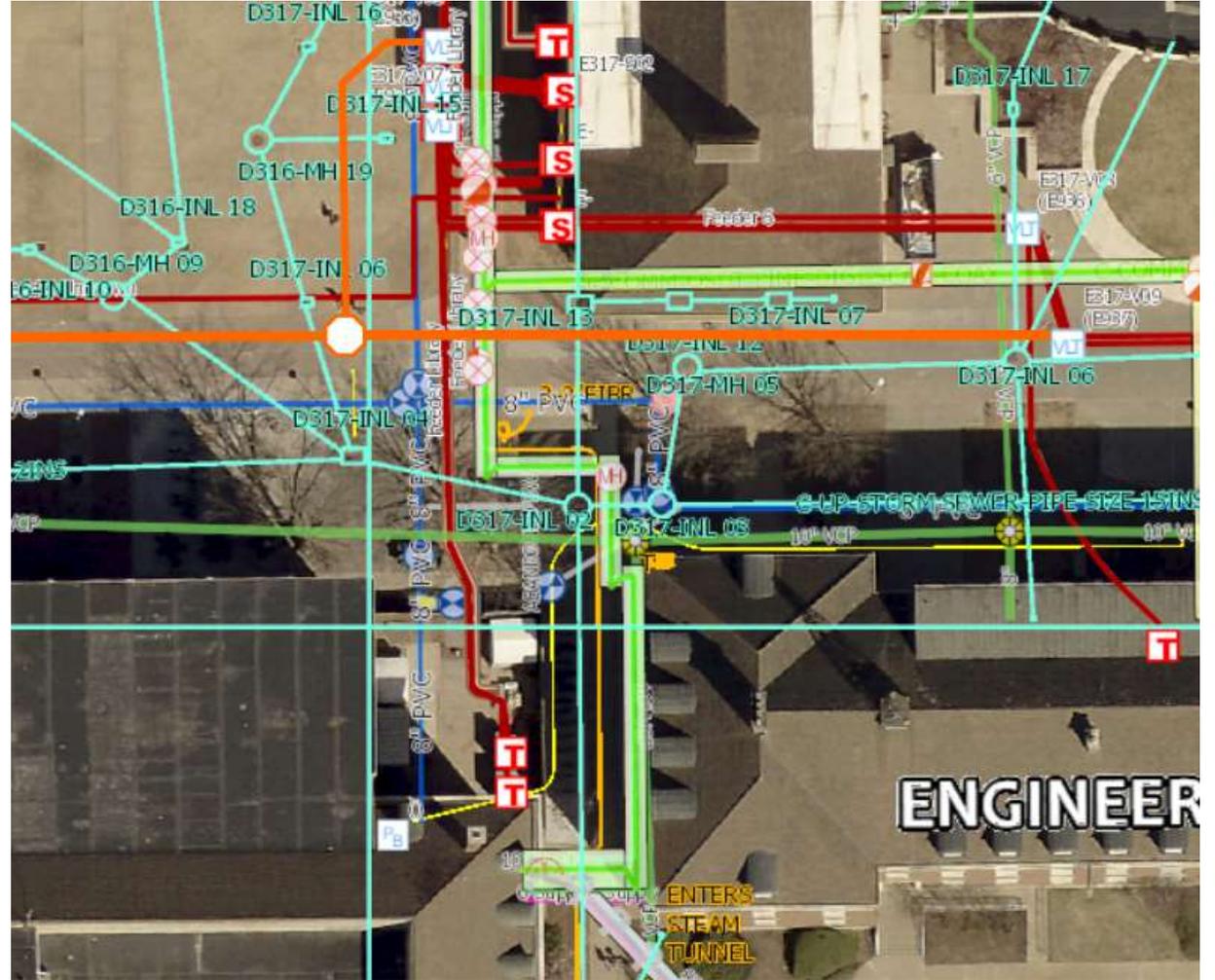
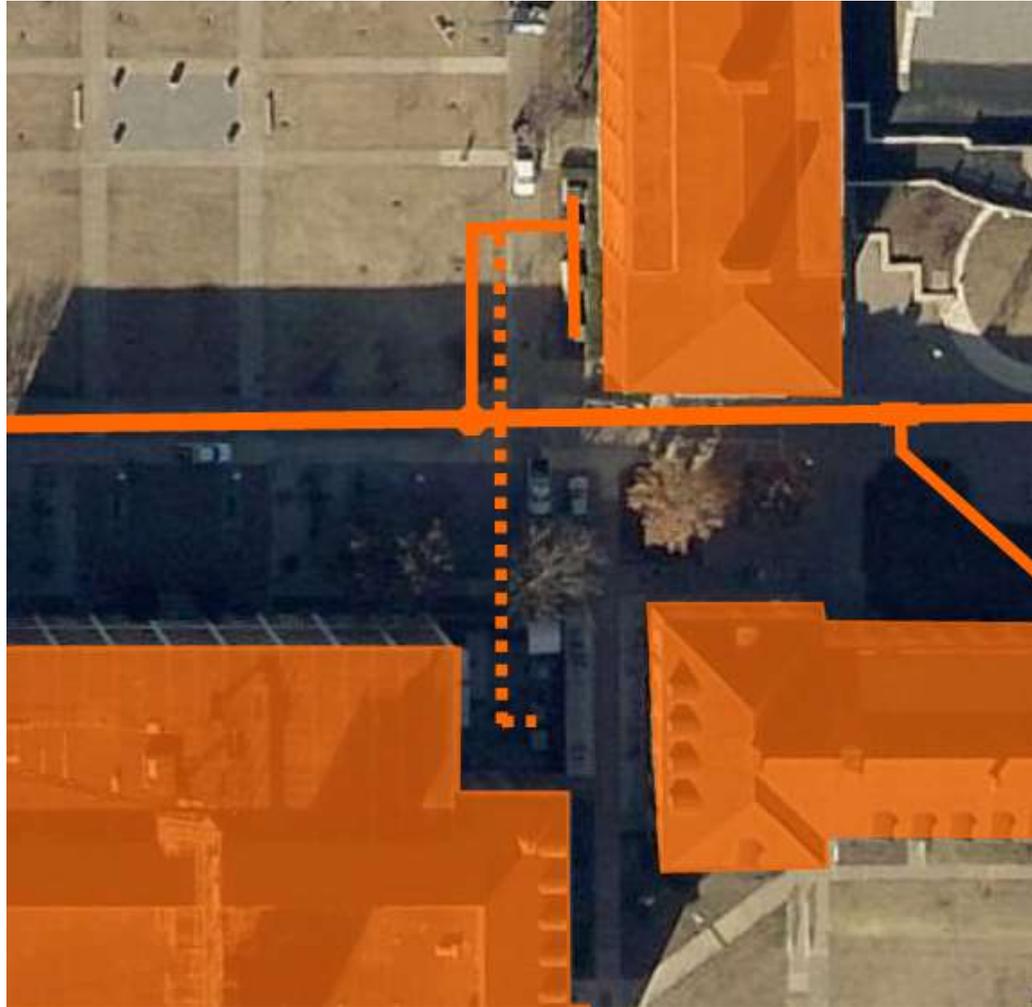
Adams Market Area



Physical Sciences Upgrade



Library / Engineering Layout



Modified Design Process

- Layout initial route
- Provide Surveyor with atlas of underground utilities
- Survey initial route and pothole each utility that intersects the initial route and note the coordinates and depth of each crossing utility
- Adjust the route as needed then re-survey and pothole
- Use the survey and pothole data to generate accurate plan and profile (P&P) drawings by the 100% Design Development milestone
- Throughout the Construction Documents phase adjust the P&P drawings as needed with drawing reviews at 30%, 60% & 90% CDs
- Go to bid knowing that the contractors are bidding on accurate information

Construction Keys for Success

■ Plan for Safety

- Engineer Safety into the project up front
- Pre-task planning
- Minimize or eliminate hazards
- Ventilation
- Equipment swing radii
- Non-Construction traffic control
- Access and egress
- Fall Restraint vs. Fall Protection
- Shoring (trench box, hydraulic shoring)
- Fencing



Construction Keys for Success

- **Campus Schedule Defines Work Schedule**

- Planned Campus activities (graduation, football)
- 82 work days of summer break

- **Understanding Trade Partner Manpower Pre-Bid**

- Divide the work to match potential trade partner manpower

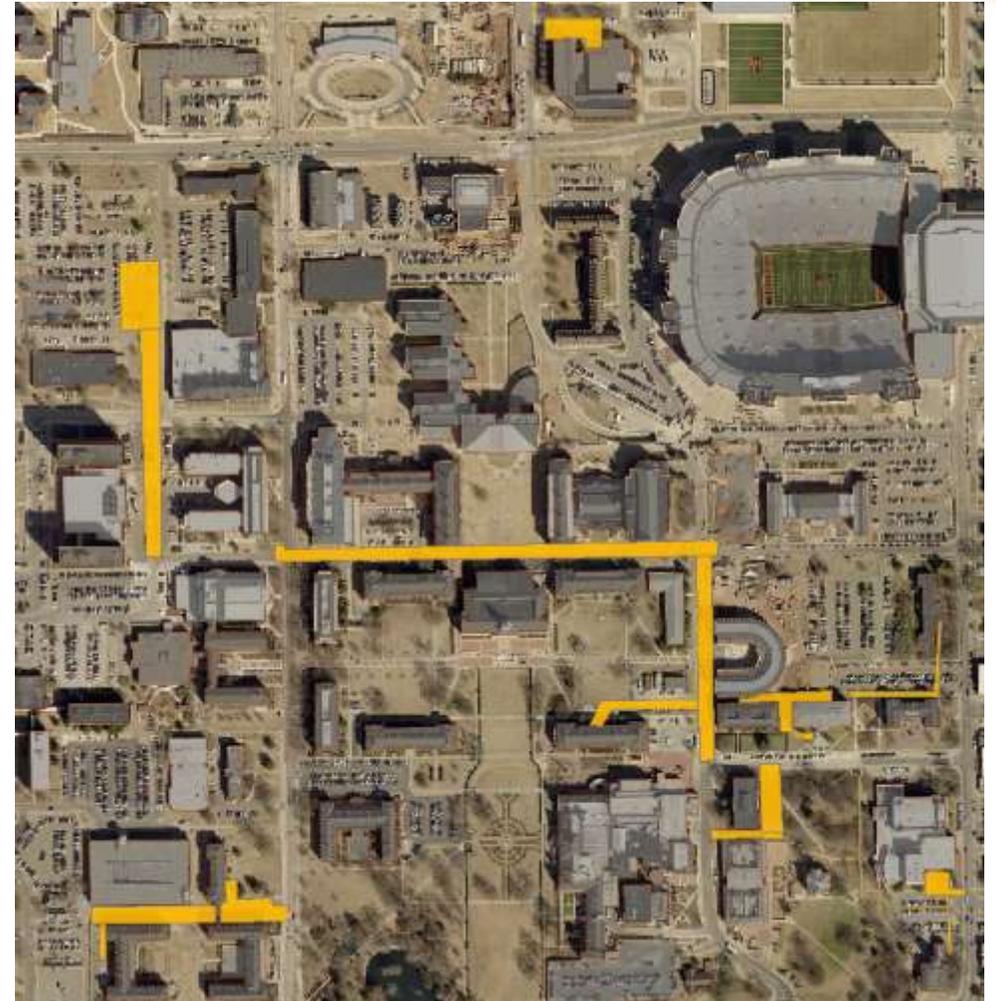
- **Potholing and Locating Existing Utilities**

- Know what's there, avoid costly changes (time and money)
- More accurate estimate of construction cost



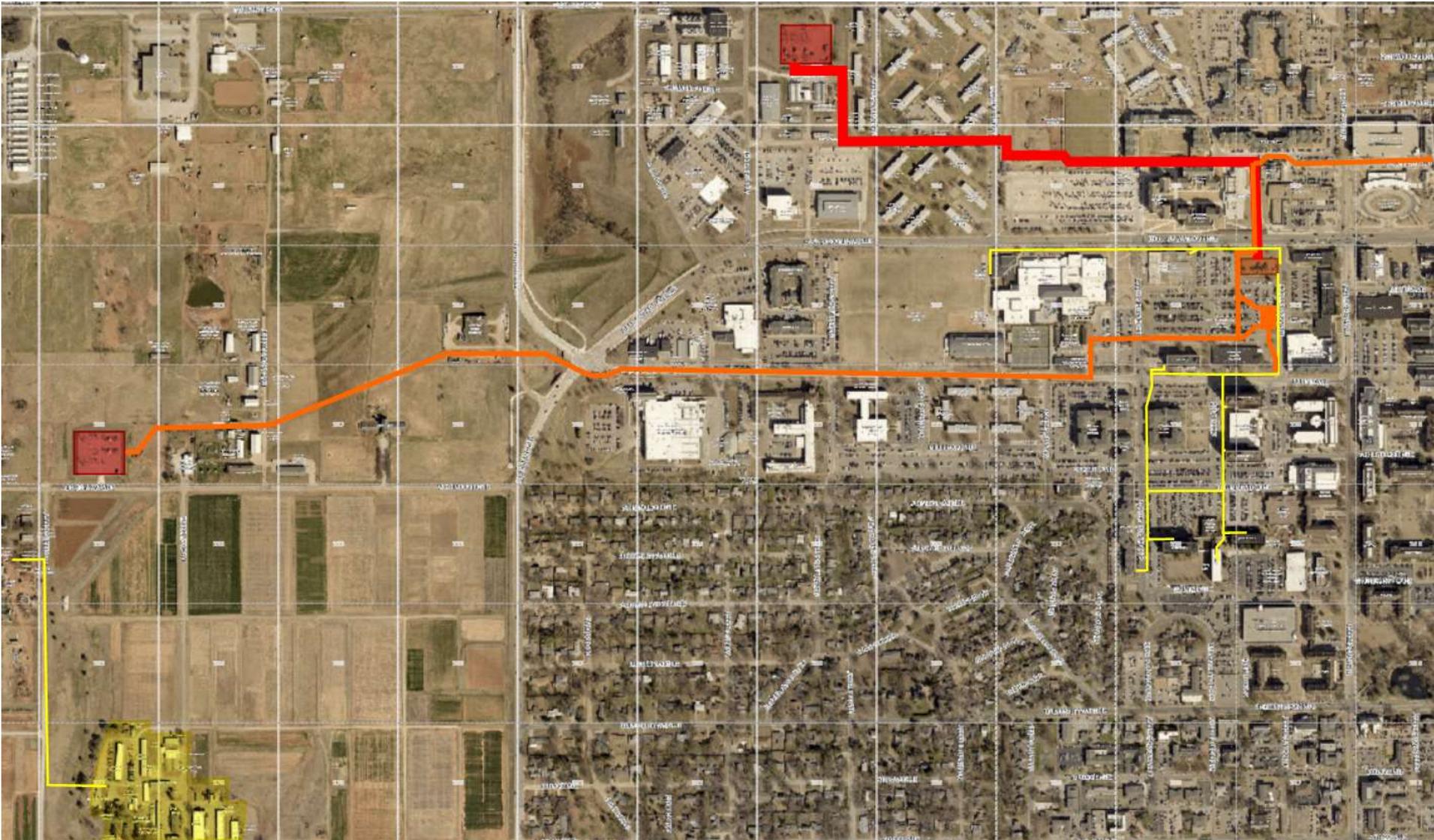
■ Communication with Campus Stakeholders

- Coordinate with Campus depts.
- Weekly email blasts
- Campus newspaper
- GIS interactive map
- Other construction work on campus
 - Multiple contractors working on the Voltage Upgrade
 - Other campus projects
- Scheduled outages
- Vehicle / Pedestrian traffic & parking



GIS Interactive Map of Construction Areas Summer 2018

Voltage Upgrade Phase 2 Overview





Questions?

FUN FACTS:

- 18,428 Linear feet of ductbank so far in the voltage upgrade
- 17 transformers, 30 vaults/manholes, 8 new switchgear
- 16,300 Yd³ of excavation; 6,100 Yd³ of concrete
- Approximately 125 Tons of cable in half-filled ductbanks
- Only 2 change orders in Phase 1 due to unforeseen conditions